PUSH-TO-TALK INTERWORKING

The present invention relates to interworking between separate communication networks using dialled connections, and especially to a Push-to-Talk communication method and system for enabling a subscriber to communicate with one or more other subscribers of one or more communication networks without using a dialling procedure.

2. Discussion of Prior Art

It is well known to use a dialing procedure in digital communication systems to set up a communication path between two subscribers of a communication network or between two subscribers of different communication networks.

U.S. patent 6,304 558 discloses a network dispatch management system for providing a dispatch service to dispatch clients via a packet-switched networks, such as the internet. This also includes a packet-switched communication originating from a wireless communication system.

SUMMARY OF THE INVENTION

It is a purpose of the present invention to provide methods and systems for providing Push-to-Talk services between subscribers of different operators.

The invention provides solutions for Push-to-Talk services interworking between different network operators, for example, interworking between Operator 1 and Operator 2. As there is no standard mechanism specified in order to realize the interworking a technical solution according to this invention is set forth below.

The Push-to-Talk feature enables a user to send a message, either streamed or transferred, to another user or a group of users after pressing a button or initializing a start signal in another known technique. Special actions have to be taken to organize a Push-to-Talk Group across operators.

Within the text of this description, the abbreviation"PoC" means Push-to-Talk over a communication system. "PoC AS" means Push-to-Talk over a Communication system application server. "Operator" means a (network) operator providing Push-to-Talk services.

A first embodiment of the invention provides a method for operating a Push-to-Talk communication between a PoC-group consisting of at least of one member of a first communication network and a PoC-group consisting of at least of one member of a second communication network. Using a PoC application server in each communication network is characterised by the steps of connecting the members of the PoC-group of the first network operator with the members of the PoC-group of the second network operator, and synchronising the PoC application servers to each other.

A second embodiment of the invention provides a method for Push-to-Talk communication between the members of an existing Push-to-Talk communication session and a group of an additional communication network, using a PoC application server in each communication network. This embodiment includes the steps of connecting the additional group to each of the existing groups of the session, and synchronising the PoC application server of the additional group to the previously synchronised PoC application servers.

The proposed Push-to-Talk interworking has several advantages.

The above mechanisms may be used for Push-To-Talk systems or any other system using group communication in any form. Further, the mechanisms apply to fixed/wireless and circuit/packet based communication networks.

Any address scheme, for example, IP-address, phone numbers,SIP-URIs, ULRs, email-addresses, among others, may be used to identify the users and groups. Dedicated signaling protocols are used to exchange information about the groups, such as size, member, status of the members, and the mechanisms may be used with two or more operators simultaneously.

BRIEF DESCRIPTION OF THE DRAWING

The objects, advantages and features of the invention will be more clearly perceived from the following detailed description, when read in conjunction with the accompanying drawing, wherein:

Fig.1 is a block diagram showing the situation when two network operators offer Push-to-Talk groups to each other;

Fig. 2 is a block diagram similar to Fig. 1, showing the situation when only operator 2 offers Push-To Talk groups to customers of operator 2 and 1;

Fig. 3 is a similiar block diagram showing a Push-to-Talk user signalling/traffic flow (Alternative 1);

Fig. 4 is another block diagram showing the Push-to-Talk user signalling/traffic flow (Alternative 2); and

Fig. 5 is yet another similar block diagram showing the Push-to-Talk user signalling/traffic flow (Alternative 3).

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In Fig. 1 the architecture is shown when two operators offer Push-to-Talk groups to each other. On the left hand side there is shown the domain of Operator 1(OP1). There is a number(1+n... m) of users (subscribers) with their end terminals 1 logged on to Operator 1. Operator 1 preferably operates his own access network 2 to provide access to his telecommunication services. There is preferably an authentication and routing element 3 which authenticates the users and routes the connection to the required services and/or destinations.

According to the invention, Operator 1 provides a PoC application server 4 (PoC AS) which hosts a Push-to-Talk group which is identified, for example, by the address "Poc-group@op1. net." The users1+n... m can be members of this Push-to-Talk group. There may also be a billing facility 5 to charge the utilised communication services to the users.

On the right hand side there is shown the domain of Operator 2 (OP2). There is a number(1... n) of users (subscribers) with their end terminals 11 logged on to Operator 2. Operator 2 may operate an access network 12 to provide access to his telecommunication services. There also can be an authentication and routing element 13 which authenticates the users and routes the connection to the required services or destinations, or both.

According to the invention, Operator 2 also provides a PoC application server 14 (PoC AS) which hosts a Push-to-Talk group which is identified, for example, by the address "Poc-group@op2. net." The users 1... n can be members of this Push-to-Talk group. There may also be a billing facility 15 to charge the required communication services to the users.

The PoC application server 4 of Operator 1 is connected via a synchronization connection and (sync) interworking connection(IC) with PoC application server 14 of Operator 2

The coordination of both Push-to-Talk groups, that is "Poc-group@op1. net" and "Poc-group@op2. net," is managed by common group management system 6.

Operator 1 and Operator 2 negotiate an agreement, that Operator 2 is allowed to offer the Push-to-Talkgroup"Poc-group@op2.net" and Operator 1 is allowed to offer the Push-to-Talk group "Poc-group@op1.net" to the other operator, respectively. Accordingly, the users n+1...m join the group Poc-group@op2.net from Op1 side and the users 1... n join the group Poc-group@op1.net from Op2 side.

Via the synchronization connection a synchronization takes place between Operator 1 and Operator 2 PoC application servers 4 and 14, so the group members of Poc-group@op1.net and Poc-group@op2.net are known to both operators, that is, Operator 2 and Operator 1. The synchronization is carried out automatically by the PoC application servers 4 and 14. There may also be a synchronization whenever a user requests update of all group members of Poc-group@op1.net and Poc-group@op2.net before sending a PoC message.

Fig. 2 shows an identical architecture as Fig. 1. In the depicted situation only Operator 2 offers Push-To-Talk groups to customers of both Operator 2 and Operator 1. Operator 1 and Operator 2 negotiate an agreement that Operator 2 is allowed to offer the group Poc-group@op2.net. Accordingly, users n+1... m join the Operator 2 group Poc-group@op2.net from the Op1 side and user 1... n join the same group Poc-group@op2.net from the Op2 side.

A synchronization takes place between Operator 1 and Operator 2 PoC application servers 4 and 14, so the group members of Poc-group@op2. net are known to both Operator 1 and Operator 2, that is, the group members of Poc-group@op1. net are only known to Operator 1 but not to Operator 2. The synchronization takes place automatically by the PoC application servers 4 and 14 and also in case a user requests update of all group members before sending a PoC message.

Fig. 3 shows the Push-to-Talk user signalling/traffic flow according to a first alternative. Only OP2 is allowed to offer his group Poc-group@op2. net to Op1. User m with his terminal 1 logged to Op1 presses, for example, a special PoC button on his terminal. It is assumed that all or parts of the members of the Poc-group@op2. net are known/not known in the Op1 PoC application server due to synchronization/request mechanism.

The messages are terminated toward all users logged on to Op1 (except user m) and to the users of the group logged on to Op2.

PoC application server 4 in connection with billing facility 5 may generate billing records and interconnection(IC) records for accounting. PoC AS 4 of Op1 acts as proxy for a single user m of Poc-group@op2.net logged on to Operator 1 network and contact the PoC application server 14 for the group Poc-group@op2. net located at Operator 2. PoC application server 14 of Operator 2 may be identified by a address derived from the group address, that is, "... op2. net"

Fig. 4 shows the Push-to-Talk user signalling/traffic flow according to a second alternative. Only OP2 is allowed to offer his group Poc-group@op2. net to Op1. User m with his terminal 1 logged to Op1 presses, for example, a special PoC button on his terminal, and all or parts of the members of the Poc-group@op2. net are known/not known in the Op1 PoC application server 4 due to synchronization/request mechanism.

The messages are terminated toward all users logged on to Op1 (except user m) and to the users of the group logged on to Op2.

The PoC application server 4 in connection with billing facility 5 may generate billing records and interconnection (IC) records for accounting. PoC AS 4 of Op1 acts as proxy for a single user of Poc-group@op2. net logged on to the Operator 1 network and contact the PoC application server 14 for the group located at Operator 2.

The PoC AS may also act as partial PoC group server (partial group proxy) for all users of Poc-group@op2.net logged on to the Operator 1 network and contact the PoC server 14 for the group Poc-group@op2.net. The traffic between the servers 4 and 14 may be a server-server connection combining the traffic of the partial groups.

The server of Operator 2 may be identified by an address derived from the group address, that is,"... op2. net".

Fig. 5 shows the Push-to-Talk user signalling/traffic flow according to a third alternative. OP2 is allowed to offer his group Poc-group@op2.net to Op1 and users of Op1 are allowed to use it. User m, with his terminal 1 logged to Op1, presses, for example, a special PoC button on his terminal and the message is directly routed to the PoC application server 14 of Operator 2.

The messages are terminated toward all users logged on to Op1 (except user m) and to the users of the group logged on to Op2.

PoC application server 4 in connection with billing facility 5 may generate billing records and interconnection (IC) records for accounting.

PoC application server14 of Operator 2 may be identified by a address derived from the group address.

While the invention has been described in detail with reference to disclosed embodiments, various modifications within the scope of the invention will be apparent to those of ordinary skill in this technological field. It is to be appreciated that features described with respect to one embodiment typically may be applied to other embodiments. Therefore, the invention properly is to be construed only with reference to the claims and reasonable equivalents.